

ATTACHMENT 8. QUALITY ASSURANCE

This application includes appropriate and well-defined quality assurance and control measures.

General

- Periodic proposed meetings (at least every two months) will be conducted to verify project findings with District staff and the consultants.
- Progress reports will be provided to DWR for review and comment regarding project status.
- The Final Project Report will be stamped by a Professional Engineer and Professional Geologist. The Cummings Basin Groundwater Model Report will be stamped by a Professional Geologist/Certified Hydrogeologist.
- All work will be performed under the supervision of, and reviewed accordingly by, a Professional Engineer, Professional Geologist or Certified Hydrogeologist.

Stakeholder Review

- Two workshops will be held at the WAPC meetings early on in the projects to offer comments regarding the project and the data developed to ensure that correct information and data are used.
- The TCCWD Board of Directors will be updated monthly on the project and be given the opportunity to provide comments, suggestions and criticisms.
- The public will be afforded the opportunity to comment on the project at Board meetings and WAPC meetings, which are open to the public.

Development of Groundwater Monitoring Well Network

- Industry standards and guidelines will be used in selecting wells for inclusion in the network including the following reference:
 - *USGS - Standard Procedures for Studies of Ground-water Quality: Selection, and Installation of Wells, and Supporting Documentation.*
- Monitoring Well Network will be designed by a certified hydrogeologist.
- Nels Ruud, included in the project team below, will provide a third-party QA/QC review of the groundwater monitoring well network.

Groundwater Sampling and Testing

- Water quality samples will be collected from each well by an experienced technician with TCCWD to ensure protection of sample integrity. District staff will follow the protocols provided in the Groundwater Monitoring Plan developed in Subtask 2.1. TCCWD's consultant will perform quality assurance/quality control (QA/QC) field reviews of TCCWD's technician's work.
 - Appropriate excerpts from ASTM D 6089-97 (2010) – *Standard Guide for Documenting a Groundwater Sampling Event* will be included in the Plan
 - Field blank and duplicate samples will be collected, as described in the proposed Groundwater Monitoring Plan
 - USGS *Guidelines and Standard Procedures for Studies of Ground-water Quality*, which includes multiple QA/QC protocols will be used as a reference in developing the Plan.
- Groundwater quality monitoring will be conducted in compliance with the Groundwater Quality Monitoring Act of 2001 (Part 2.76 commencing with Sec. 10780 of Division 26 of the CWC).

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- Water quality testing will be performed by certified, experienced testing laboratories to ensure appropriate testing methods and chain of custodies. Methodologies shall be in accordance with:
 - *Standard Methods for Examination of Water and Wastewater American Public Health Association*, 1998, Standard methods for the examination of water and wastewater (20th ed.): Washington, American Public Health Association, American Water Works Association, and Water Environment Federation.
 - US EPA applicable guidelines for individual constituents.

Groundwater Modeling

- Oscar Daza, included the project team below, will provide a third-party QA/QC review of the numerical model prepared by the groundwater modeling consultant.
- The following standards will be utilized in developing the Cummings Basin Groundwater Model update:
 - ASTM D 5981–96 (Reapproved 2002). *Standard Guide for Calibrating a Ground-Water Flow Model Application*
 - ASTM D 5611–94 (Reapproved 2008). *Standard Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application*
- The groundwater model software files will be thoroughly documented for future analysis. The following standard will be utilized:
 - ASTM D 5718–95 (Reapproved 2000). *Standard Guide for Documenting a Ground-Water Flow Model Application*

Technical Review

- All work performed on the study will be reviewed by the consultant's senior staff and by a District representative before submission to DWR.
- Review comments on all reports listed in the deliverables will be solicited, and incorporated when merited, from the DWR, urban water purveyors, District Board members, the general public, and other pertinent agencies.

Project Team

An organization chart for the projects is shown as **Figure 8.1**. This figure shows DWR, TCCWD staff and technical consultants.

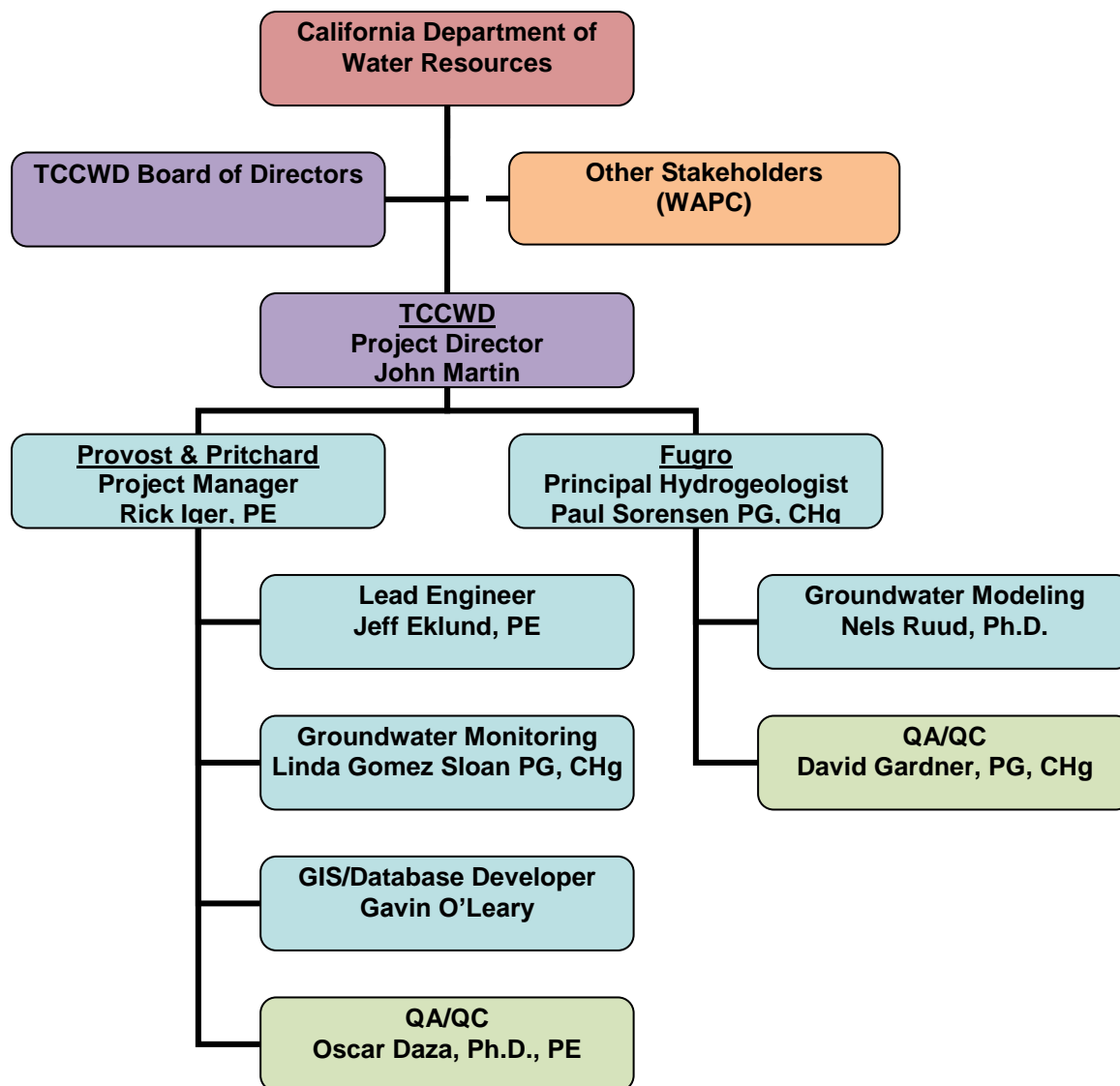


Figure 8.1 – Project Organization Chart

Principal staff working on the project have the qualifications and skills to successfully complete the work. All of the team members have experience with groundwater projects in the Tehachapi Area. A brief description of the major project team members follows:

Tehachapi-Cummings County Water District

John Martin, Project Director

John Martin has been the General Manager of the Kings County Water District for more than 4 years. Mr. Martin has been actively involved in the groundwater management activities including development of groundwater recharge and groundwater banking facilities in TCCWD. He also assumes the duties of Watermaster by producing Annual Watermaster Reports, overseeing water transfers, and executing rules and regulations. As general manager of a water district, Mr. Martin has extensive project management experience and will help ensure the project is completed on time and on budget. Mr. Martin has a Masters of Public Administration and is a Certified Public Finance Officer (No. 384).

Provost & Pritchard Consulting Group

Rick Iger, PE - Project Manager

Mr. Iger is a principal engineer at Provost & Pritchard with over 34 years of experience in water resources engineering projects. He is a Registered Civil Engineer (RCE 38272). His experience includes complete development and management of a variety of engineering projects including flood protection, floodplain management, and conjunctive use and conveyance facilities. His technical experience includes planning, design, construction, maintenance/improvement, operations, monitoring and evaluation of flood protection systems such as channels and levees; groundwater recharge and recovery facilities; and water conveyance and storage facilities. Mr. Iger also has project administration skills including reporting and administration of DWR and Reclamation grants and loans; preparation of reports documenting system performance; preparation and coordination of integrated regional and urban water management plans; and overseeing and facilitating technical and policy related committees. Most notably he was the project manager responsible for helping develop the Tehachapi Regional Urban Water Management Plan in 2011.

Jeff Eklund, PE – Lead Engineer

Mr. Eklund is a civil engineer with nine years of experience in the field of water resources engineering. He has worked on water management projects in the Tehachapi area, including water distribution, groundwater recharge and extraction projects, water resource planning, and groundwater quality issues. Mr. Eklund has worked for multiple water agencies in the Tehachapi area, including TCCWD, Stallion Springs CSD, and Golden Hills CSD. Recently, he has worked on a water supply study for Golden Hills CSD that included a comprehensive analysis of water use by land use using GIS tools and water use records. He is the project manager for a nitrate transport modeling study analyzing the impacts of septic systems localized to the Golden Hills community. Additionally, he has been responsible for preparing quarterly reports, final project reports, and annual monitoring reports for DWR administered grants (e.g. Urban Drought Assistance Grant for new water meters and the Proposition 13 grant for the Antelope Dam Conjunctive Use Project, both for Golden Hills CSD). He has also worked on water distribution and recharge projects for TCCWD including planning and design of a transmission pipeline for delivering recycled water from CCI to the golf course in Stallion Springs and a transmission pipeline delivering recharge water to the Chanac Creek Recharge Area. Mr. Eklund has a BS in Civil Engineering and is a Professional Civil Engineer (No. C75680) licensed in California.

Linda Gomez Sloan, PG, CHg – Groundwater Monitoring

Ms. Sloan is a Professional Geologist and Certified Hydrogeologist with over a decade of professional environmental and water resource experience, including involvement with all aspects of groundwater monitoring, reporting, and data assessment. Ms. Sloan's professional experience includes regulatory permitting and compliance, and water supply well construction and design. She is responsible for providing monitoring and reporting services, as well as data assessment for a number of groundwater monitoring well networks used for hydrogeologic characterization of groundwater quality, groundwater flow direction and velocity, and aquifer hydraulic properties. Ms. Sloan has a BS and MS in Geology and is a Professional Geologist (No. 8299) and Certified Hydrogeologist (No. 930) in California.

Gavin O'Leary – GIS/Database Developer

Mr. O'Leary is a geographic information systems specialist with eight years experience. He has an extensive background in spatial analysis and database creation with geospatial data. Mr.

O'Leary's areas of expertise include mapping and analysis of well water depth data, spatial analysis of groundwater quality and water use, and management of water agency facilities data. He has also worked as an aquatic scientist for California Department of Water Resources and has supported resource management and conservation planning with geographic information systems (GIS) while working in a contract position for the California Department of Fish and Game. Most recently, he has worked with Mr. Eklund on the water supply study for Golden Hills CSD that included a comprehensive analysis of water use by land use using GIS tools and water use records. Additionally, he has worked with Mr. Eklund on a complete water system and well inventory for the Shafter-Wasco Irrigation District that included an immense dataset, map products, and database. Mr. O'Leary has a BS in Fisheries Biology and Management.

Oscar Daza, Ph.D., PE – QA/QC Review

Dr. Daza is a senior water resources engineering specialist with over 25 years of experience in agricultural land improvement and reclamation projects. His background has been mostly in irrigation and drainage engineering abroad. During the last eight years he has been teaching several courses in the area of water resources in the Civil and Environmental Engineering Department, California Polytechnic State University, San Luis Obispo, CA. Among the classes taught are Groundwater Hydraulics and Hydrology and Groundwater Contamination (with emphasis in Groundwater Modeling and Simulation). Past experience includes the design and construction of pipe delivery systems and pump stations for surface and sprinkler irrigation, subsurface drainage and drainage pump stations, hydraulic structures in delivery canals, levees for flood protection, groundwater wells, and storage/regulation reservoirs. His experience also includes the use of modeling and simulation techniques, and specialized application packages in the solution of complex water distribution, drainage, canal, and groundwater flow and transport systems. Mr. Daza has a BS in Agricultural Engineering, an MS in Agricultural Water Management, and a PhD in Agricultural and Irrigation Engineering.

Fugro Consultants, Inc.

Paul Sorensen, PG, CHG – Principal Hydrogeologist

Mr. Sorensen has more than 30 years experience managing and directing projects related to hydrogeology, geology and engineering geology, with specific expertise in groundwater supply, basin analysis, and water resource management. His technical expertise includes regional groundwater basin analyses; perennial yield and basin water balance calculations; groundwater quality studies; aquifer test analyses; and water well, injection well, and monitoring well design and construction. Recent work has included serving as the responsible hydrogeologist for a variety of basin-wide water resource projects including basin analyses and basin-wide water balance and hydrologic budget conceptualization and calculations, and basin-wide modeling. Mr. Sorensen has a BS and MA in Geology and is a Professional Geologist and Certified Hydrogeologist in California.

Nels Ruud, Ph.D. – Groundwater Modeling

Dr. Ruud has more than 14 years of experience performing water resource studies in California. His experience includes numerical modeling of regional and local scale groundwater flow and solute transport problems, well hydraulics, aquifer characterization, hydrologic and crop water balance modeling, and agricultural water management. His responsibilities have included data collection & analysis, report preparation, project management, interaction with academic institutions and government agencies, and publishing in peer-reviewed journals. Mr. Ruud has a BS in Statistics and a Ph.D. in Soil Science.

David Gardner, PG, CHg – QA/QC

Mr. Gardner is the Senior Vice President of Fugro Consultants, Inc. Prior to joining the firm, Mr. Gardner was a founding principal of the firm Staal, Gardner & Dunne, Inc. Mr. Gardner has more than 30 years of experience in directing projects involving groundwater resources and environmental engineering in California. He has served as the responsible hydrogeologist for a variety of water resource projects in California including basin groundwater management, safe yield studies, municipal well design, artificial recharge, and surface and groundwater quality monitoring. Mr. Gardner has provided attorney assistance and expert witness testimony involving groundwater litigation and conducted studies involving water rights, environmental impacts, and groundwater management.